

What is claimed is:

1. A cooler for electronic devices comprising;

(i) a heat exchange element having a first and a second surfaces, a blower with a radial type impeller, and an electric drive, wherein;

(ii) said heat exchange element comprising heat exchanging means made on the first surface of said heat exchange element while its second surface provides thermal contact with a heat-radiating means;

(iii) said radial type impeller has a shroud with a flat surface from one side, a hub and brackets and a central inlet between the shroud and the hub, said brackets connect the hub with the shroud; said radial type impeller is positioned on the heat exchange element so that the heat exchanging means being surrounded by the radial type impeller and a cooling gas flows to the radial type impeller from the central inlet through the heat exchanging means;

(iv) said electric drive comprising a magnetic rotor and a stator; said magnetic rotor is a substantially flat disk rotor comprising a central hole inside the substantially flat disk rotor and circumferential arrayed like poles, said stator comprising circumferential arrayed coils, axis of said coils are parallel to the axis of rotation, said coils mounted around of the circumferential arrayed like poles; said magnetic rotor is placed on the shroud of the radial type impeller and connect with the shroud, the shaft of the electric drive is located inside the hub of the radial type impeller, and the central hole of the flat disk rotor is substantially coincided with the central inlet.

2. A cooler for electronic devices as claimed in claim 1, wherein said substantially flat disk rotor further comprising at least two magnetized rings having the central hole inside the rings and circumferential arrayed like poles and being mounted perpendicularly to the axis of rotation, and said circumferential arrayed like poles of one of the magnetized ring being magnetized in opposite polarity and coincide to the circumferential arrayed like poles of another magnetized ring in a projection at a plane normal to the axis of rotation said at least two flat rings installed with a gap between said flat rings in a place, where the magnetic rotor interact with the stator and with a contact between said flat ring axially beyond the gap, said coils of said stator at least partially mounted at the gap between the circumferential

arrayed like poles of one of the magnetized ring and the like circumferential arrayed poles of the another adjacent magnetized ring.

3. A cooler for electronic devices as claimed in claim 2, further including a cylindrical magnet, said cylindrical magnet being magnetized in the axial direction and placed coaxially to the shaft between said magnetized disks.

4. A cooler for electronic devices as claimed in claim 1, wherein the heat exchanging means are pins and fins.

5. A cooler for electronic devices as claimed in claim 1, wherein the heat-radiating means is the electronic device.

6. A cooler for electronic devices as claimed in claim 1, wherein the heat-exchange element is made from a high heat-conducting material.

7. A cooler for electronic devices as claimed in claim 1, wherein the heat-radiating means is a heat-pipe.

8. A cooler for electronic devices as claimed in claim 1, wherein the brackets are axial blower blades.

9. A cooler for electronic devices as claimed in claim 1, wherein one of the flat rings of the magnetic rotor is placed flush-mounted with the flat surface of one side of the shroud of the radial type impeller.

10. A cooler for electronic devices as claimed in claim 1, wherein the flat rings are magnetized in a such way that the poles of each flat rings are like poles, while in relation to the poles of another flat rings they are unlike poles, the magnetic rotor poles are made up by teeth on the outer circumferences of said flat rings, said teeth coincide along the direction of said rotation axis.

11. A cooler for electronic devices as claimed in claim 1, wherein the radial type impeller is a drum type impeller.

12. A cooler for electronic devices as claimed in claim 1, wherein the radial type impeller is a disk-type impeller, said disk type impeller comprising at least one disk.

13. A cooler for electronic devices as claimed in claim 1, wherein the stator poles are placed in the space between the said magnetic rotor poles made on both disks.

14. A cooler for electronic devices comprising:

(i) a heat exchange element having a first and a second surfaces, a blower with a radial type impeller and an electric drive, wherein;

(ii) said heat exchange element has heat exchanging means and heat exchanging channels made on the first surface of said heat exchange element, while its second surface provides thermal contact with a heat-radiating means;

(iii) said radial type impeller comprising a shroud with a flat surface from one side, a hub, brackets, and a central inlet between the shroud and the hub, said brackets connect the hub with the shroud:

(iv) said heat exchanging means being surrounded by the radial type impeller, said radial type impeller being surrounded by said heat exchanging channels and a cooling gas flows from the central inlet through the heat exchanging means, the radial type impeller and the heat exchanging channels in a series way;

(v) said electric drive comprising a magnetic rotor and a stator; said magnetic rotor comprising at least two magnetized rings having a hole inside said rings and circumferential arrayed like poles and being mounted perpendicularly to the axis of rotation, and said circumferential arrayed like poles of one of the magnetized ring being magnetized in opposite polarity and coincide to the circumferential arrayed like poles of another magnetized ring in a projection at a plane normal to the axis of rotation said at least two flat rings installed with a gap between said flat rings in a place, where the magnetic rotor interact with the stator and with a contact between said flat ring axially beyond the gap; said stator comprising circumferential arrayed coils, axis of said coils are parallel to the axis of rotation, said coils at least partially mounted at the gap between the circumferential arrayed like poles of one of the magnetized ring and the like circumferential arrayed poles of the another adjacent magnetized ring; one of the flat rings of said magnetic rotor is placed on the shroud of the radial type impeller, a shaft of the electric drive is located inside the hub of the radial type impeller, and the hole inside the rings is substantially coincided with the central inlet.

15. A cooler for electronic devices as claimed in claim 14, wherein the heat exchanging means are pins and/or fins.

16. A cooler for electronic devices as claimed in claim 14, wherein the heat exchanging channels are formed by rows of profiled elements.

17. A cooler for electronic devices as claimed in claim 16, wherein said profiled elements comprising pins and/or fins.

18. A cooler for electronic devices as claimed in claim 14, wherein the heat exchanging channels are made spiral-like and bent in the direction of blower rotation.

19. A cooler for electronic devices as claimed in claim 14, wherein inlets of the heat exchanging channels are oriented in the direction of propagation of an output of the cooling gas flow produced by the radial type impeller.

20. A cooler for electronic devices as claimed in claim 14, wherein the heat exchanging channels are made of constant width.

21. A cooler for electronic devices as claimed in claim 14, wherein the heat radiating means is an electronic device.

22. A cooler for electronic devices as claimed in claim 14, wherein the heat exchanging means is made from a high heat-conducting material.

23. A cooler for electronic devices as claimed in claim 14, wherein the heat radiating means is a heat-pipe.

24. A cooler for electronic devices as claimed in claim 14, wherein the brackets are axial blower blades.

25. A cooler for electronic devices as claimed in claim 14, wherein one of the flat rings of the magnetic rotor is placed flush-mounted with the flat surface of one side of the shroud of the radial type impeller.

26. A cooler for electronic devices as claimed in claim 14, wherein the flat rings are magnetized in a such way that the poles of each flat rings are like poles, while in relation to the poles of another flat rings they are unlike poles, the magnetic rotor poles are made up by teeth on the outer circumferences of said flat rings.

27. A cooler for electronic devices as claimed in claim 14, further including a cylindrical magnet, said cylindrical magnet being magnetized in the axial direction and placed coaxially to the shaft between said magnetized disks.

28. A cooler for electronic devices as claimed in claim 14, wherein the radial type impeller is a drum type impeller.

29. A cooler for electronic devices as claimed in claim 14, wherein the radial type impeller is disk type impeller, said disk type impeller comprising at least one disk.

30. A cooler for electronic devices as claimed in claim 14, wherein the stator is being made like printed circuit board, said printed circuit board covers the heat exchanging channels from the opposite side of the surface, which provides thermal contact with the heat-radiating means.

31. A cooler for electronic devices as claimed in claim 14, wherein the stator poles are placed in the space between the said magnetic rotor poles made on both disks.

32. An electric drive for cooler for electronic device comprising a stator, a magnetic rotor and a motor controller, wherein; said magnetic rotor comprising at least two magnetized rings having circumferential arrayed like poles and being mounted perpendicularly to the axis of rotation, and said circumferential arrayed like poles of one of the magnetized ring being magnetized in opposite polarity and coincide to the circumferential arrayed like poles of another magnetized ring in a projection at a plane normal to the axis of rotation said at least two flat rings installed with a gap between said flat rings in a place, where the magnetic rotor interact with the stator and with a contact between said flat ring axially beyond the gap, said rotor having a hole inside the two magnetized rings; said stator comprising circumferential arrayed coils, axis of said coils are parallel to the axis of rotation, said coils at least partially mounted at the gap between the circumferential arrayed like poles of one of the magnetized ring and the like circumferential arrayed poles of the another adjacent magnetized ring; one of the flat rings of said magnetic rotor is placed on an annular flat disk made from nonmagnetic material, said annular flat disk being connected by brackets with a shaft of the electric drive, and an area inside said annular flat disk is coincided with the hole.

33. An electric drive for cooler for electronic devices as claimed in claim 32, wherein the brackets are made in the form of axial blower blades.

34. An electric drive for cooler for electronic devices as claimed in claim 32, wherein the flat rings are magnetized in a such way that the poles of each flat rings are like poles, while in relation to the poles of another flat rings they are unlike poles, the magnetic rotor poles are made up by teeth on the outer circumferences of said flat rings.

35. An electric drive for cooler for electronic devices as claimed in claim 32, further including a cylindrical magnet, said cylindrical magnet being magnetized in the axial direction and placed coaxially to the shaft between said magnetized disks.

36. An electric drive for cooler for electronic devices as claimed in claim 32, wherein the stator being made like printed circuit board.

37. A cooler for electronic devices comprising at least two heat exchange elements each of said heat exchange elements has a first and a second surfaces, a blower with a radial type impeller, and an electric drive, wherein said heat exchange element comprising heat exchanging means made on the first surface of said heat exchange element while its second surface provides thermal contact with a heat-radiating means; said radial type impeller has two shrouds, each of said shrouds has a flat surface from one side, a hub and a central inlet between the shroud and the hub; said radial type impeller is positioned on the heat exchange element so that a cooling gas flows from the central inlet through the radial type impeller and the heat exchanging means in a series way; said electric drive comprising a magnetic rotor and a stator; said magnetic rotor is a substantially flat disk rotor comprising circumferential arrayed like poles, said stator comprising circumferential arrayed coils, axis of said coils are parallel to the axis of rotation, said coils mounted around of the circumferential arrayed like poles; said magnetic rotor is placed on the shrouds of the radial type impeller and connect with the shrouds, the shaft of the electric drive is located inside the hub of the radial type impeller, said substantially flat disk rotor further comprising at least two magnetized rings circumferential arrayed like poles and being mounted perpendicularly to the axis of rotation, and said circumferential arrayed like poles of one of the magnetized ring being magnetized in opposite polarity and coincide to the circumferential arrayed like poles of another magnetized ring in a projection at a plane normal to the axis of rotation said at least two flat rings installed with a gap between said flat rings in a place, where the magnetic rotor interact with the stator and with a contact between said flat ring axially beyond the gap, said coils of said stator at least partially mounted at the gap between the circumferential arrayed like poles of one of the magnetized ring and the like circumferential arrayed poles of the another adjacent magnetized ring, and wherein said heat radiating means is at least one heat pipe and said at least one heat pipe is in a contact with two second surfaces of said at least two heat exchange elements.

38. A cooler for electronic devices comprising:

a heat exchange element having a first and a second surfaces, a blower with a radial type impeller, a heat radiating means and an electric drive, wherein; said heat exchange

element has heat exchanging means made on the first surface of said heat exchange element, said radial type impeller comprising at least two shroud, each of said at least two shroud has a flat surface from one side, work elements from another side, a hub, (brackets ?), and a central inlet between the work elements and the hub, said shrouds connected with the hub; said radial type impeller being surrounded by said heat exchanging means and a cooling gas flows from the central inlet through the radial type impeller and the heat exchanging means in a series way; said electric drive comprising a magnetic rotor and a stator; said magnetic rotor comprising at least two magnetized rings having circumferential arrayed like poles and being mounted perpendicularly to the axis of rotation, and said circumferential arrayed like poles of one of the magnetized ring being magnetized in opposite polarity to the circumferential arrayed like poles of another magnetized ring in a projection at a plane normal to the axis of rotation, said at least two flat rings installed with a gap between said flat rings in a place, where the magnetic rotor interact with the stator and with a contact between said flat ring axially beyond the gap; said stator comprising circumferential arrayed coils, axis of said coils are parallel to the axis of rotation, said coils at least partially mounted at the gap between the circumferential arrayed like poles of one of the magnetized ring and the like circumferential arrayed poles of the another adjacent magnetized ring; everyone of the flat rings of said magnetic rotor is placed on the flat surface of the everyone of the at least two shroud of the radial type impeller and connect with them, a shaft of the electric drive is located inside the hub of the radial type impeller, and wherein said stator is located on a flat plate, said flat plate connects with the heat exchanging means, and the heat-radiating means is located between the heat exchanging means.